

LAB RECORD CN CYCLE TEST 2

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CYCLE 2 EXPERIMENTS:

1. Write a program for error detecting code using CRC-CCITT (16-bits).

```
#include <iostream>
#include <string.h>

using namespace std;

int crc(char *ip, char *op, char *poly, int mode)
{
    strcpy(op, ip);
    if (mode) {
        for (int i = 1; i < strlen(poly); i++)
            strcat(op, "0");
        cout << "modified input" << op << endl;
    }
    for (int i = 0; i < strlen(ip); i++) {
        if (op[i] == '1') {
            for (int j = 0; j < strlen(poly); j++) {
                if (op[i + j] == poly[j])
                    op[i + j] = '0';
                else
                    op[i + j] = '1';
            }
        }
    }
    for (int i = 0; i < strlen(op); i++)
        if (op[i] == '1')
            return 0;
    return 1;
}

int main()
{
```

```

    char ip[50], op[50], recv[50];    char
poly[] = "10001000000100001";    int
choice;
    cout << "Enter the input message in binary:";
cin >> ip;
    cout << "generated polynomial is" << poly << endl;
crc(ip, op, poly, 1);
    cout<<"The checksum is:"<<op+strlen(ip)<<endl;
    cout << "The transmitted message is: " << ip << op + strlen(ip) << endl;
cout << "do you want to test error" << endl;    cin >> choice;    if(choice
== 1)
{
    int pos,n;
char cp[50];
strcmp(cp, op);
        cout<<"Enter the position where to insert error bit"<<endl;
        cin>>pos;
        cout << "enter bit you wanted to insert" <<endl;
        cin >> n;
        cp[pos]=n;
        if(!strcmp(op, cp))
        {
            cout << "No error"<<endl;
        }
        else
        {
            cout << "Error occured"<<endl;
        }
        return 0;
    }
    else{ cout << ""<<endl;}
    cout << "Enter the received message in binary" << endl;
cin >> recv;    if (crc(recv, op, poly, 0))    cout << "No
error in data" << endl;    else

        cout << "Error in data transmission has occurred" << endl;

    return 0;
}

```

OUTPUT :

Output 1

```
Enter the input message in binary:1011101
generated polynomial is10001000000100001
modified input101110100000000000000000
The checksum is:1000101101011000
The transmitted message is: 10111011000101101011000
do you want to test error
1
Enter the position where to insert error bit
3
enter bit you wanted to insert
0
Error occured
```

Output 2

```
Enter the input message in binary:1011101
generated polynomial is10001000000100001
modified input101110100000000000000000
The checksum is:1000101101011000
The transmitted message is: 10111011000101101011000
do you want to test error
0

Enter the recevied message in binary
10111011000101101011001
Error in data transmission has occurred
```

2. Write a program for distance vector algorithm to find suitable path for transmission.

```
#include <bits/stdc++.h> using
namespace std;
#define MAX 10
int n;
class router {
```

```

char adj_new[MAX], adj_old[MAX]; int
table_new[MAX], table_old[MAX];
public: router( ){
for(int i=0;i<MAX;i++) table_old[i]=table_new[i]=99;
}
void copy( ){ for(int
i=0;i<n;i++) { adj_old[i]
=adj_new[i];
table_old[i]=table_new[i];
}
}
int equal( ) { for(int
i=0;i<n;i++)
if(table_old[i]!=table_new[i] || adj_new[i]!=adj_old[i])return 0; return
1;
}
void input(int j) {
cout<<"Enter 1 if the corresponding router is adjacent to router"
<<(char)('A'+j)<<" else enter 99: "<<endl<<" ";
for(int i=0;i<n;i++) if(i!=j)
cout<<(char)('A'+i)<<" ";
cout<<"\nEnter matrix:";
for(int i=0;i<n;i++) { if(i==j)
table_new[i]=0; else
cin>>table_new[i];
adj_new[i]= (char)('A'+i);
}
cout<<endl;
}
void display(){
cout<<"\nDestination Router: "; for(int
i=0;i<n;i++) cout<<(char)('A'+i)<<" ";
cout<<"\nOutgoing Line: "; for(int
i=0;i<n;i++) cout<<adj_new[i]<<" ";
cout<<"\nHop Count: ";
for(int i=0;i<n;i++) cout<<table_new[i]<<" ";
}
void build(int j) { for(int
i=0;i<n;i++) for(int
k=0;(i!=j)&&(k<n);k++)
if(table_old[i]!=99)

```

```

if((table_new[i]+table_
new[k])<table_new[k])
{
table_new[k]=table_ne
w[i]+table_new[k];
adj_new[k]=(char)('A'+i);
}
}
} r[MAX]; void
build_table( ) { int
i=0, j=0; while(i!=n)
{ for(i=j;i<n;i++) {
r[i].copy();
r[i].build(i);
}
for(i=0;i<n;i++) if(!r[i].equal())
{
j=i;
break;
}
}
}
int main() {
cout<<"Enter the number the routers(<<MAX<<"): "; cin>>n;
for(int i=0;i<n;i++) r[i].input(i); build_table(); for(int
i=0;i<n;i++) {
cout<<"Router Table entries for router "<<(char)('A'+i)<<":-";
r[i].display();
cout<<endl<<endl;
}
}
}

```

OUTPUT :

```

Enter the number the routers(<10): 5
Enter 1 if the corresponding router is adjacent to routerA else enter 99:
  B C D E
Enter matrix:1 1 99 99

Enter 1 if the corresponding router is adjacent to routerB else enter 99:
  A C D E
Enter matrix:1 99 99 99

Enter 1 if the corresponding router is adjacent to routerC else enter 99:
  A B D E
Enter matrix:1 99 1 1

Enter 1 if the corresponding router is adjacent to routerD else enter 99:
  A B C E
Enter matrix:99 99 1 99

Enter 1 if the corresponding router is adjacent to routerE else enter 99:
  A B C D
Enter matrix:99 99 1 99

Router Table entries for router A:-
Destination Router: A B C D E
Outgoing Line: A B C D E
Hop Count: 0 1 1 99 99

Router Table entries for router B:-
Destination Router: A B C D E
Outgoing Line: A B C D E
Hop Count: 1 0 99 99 99

Router Table entries for router C:-
Destination Router: A B C D E
Outgoing Line: A B C D E
Hop Count: 1 99 0 1 1

Router Table entries for router D:-
Destination Router: A B C D E
Outgoing Line: A B C D E
Hop Count: 99 99 1 0 99

Router Table entries for router E:-
Destination Router: A B C D E
Outgoing Line: A B C D E
Hop Count: 99 99 1 99 0

```

3. Implement Dijkstra's algorithm to compute the shortest path for a given topology.

```

#include<iostream>
#include<climits> using
namespace std; int
a[30][30],n;
int minimum(int visited[],int dist[])
{
    int mindis=10000, mini;
    for(int i=0;i<n;i++)
    {
        if(!visited[i] && dist[i]<mindis)
        {
            mindis=dist[i];
            mini=i;
        }
    }
    return mini;
}

void dijkstra(int src)
{
    int dist[n],visited[n];

    for(int i=0;i<n;i++)
    {
        dist[i]=10000;
        visited[i]=0;
    }
    dist[src]=0;
    for(int i=0;i<n-1;i++)
    {
        int u=minimum(visited,dist);
        visited[u]=1;
        for(int v=0;v<n;v++)
        {
            if(!visited[v] && a[u][v]!=10000 && dist[u]!=10000 &&
(dist[u]+a[u][v])<dist[v])
                dist[v]=dist[u]+a[u][v];
        }
    }
    cout<<"Shortest paths to all other vertices from "<<src<<" is "<<endl;

```

```

        cout<<"Vertices\tDistance from source"<<endl;
for(int i=0;i<n;i++)
{
    if(i!=src)
        cout<<i<<"\t\t"<<dist[i]<<endl;
}
}

int main()
{
    cout<<"Enter the no. of vertices"<<endl;
    cin>>n;
    cout<<"Enter the weighted adjacency matrix (enter 10000 if there is
no edge)"<<endl; for(int i=0;i<n;i++)
    {
        for(int j=0;j<n;j++)
            cin>>a[i][j];
    }
    int src;
    cout<<"Enter the source vertex"<<endl;
    cin>>src;
    dijkstra(src);
    return 0;
}

```

OUTPUT :

```

Enter the no. of vertices
4
Enter the weighted adjacency matrix (enter 10000 if there is no ed
ge)
1 5 7 10000
10000 7 4 2
6 8 0 1
10000 10000 6 3
Enter the source vertex
3
Shortest paths to all other vertices from 3 is
Vertices      Distance from source
0              12
1              14
2              6

```

4. Write a program for congestion control using Leaky bucket algorithm.


```

#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>

#define NOF_PACKETS 5
int
main()
{
    int packet_sz[NOF_PACKETS], i, clk, b_size, o_rate, p_sz_rm=0, p_sz, p_time,
    op;    for(i = 0; i<NOF_PACKETS; ++i)    packet_sz[i] = random() % 100;
    for(i = 0; i<NOF_PACKETS; ++i)
        printf("\npacket[%d]:%d bytes\t", i, packet_sz[i]);
    printf("\nEnter the Output rate:");    scanf("%d",
    &o_rate);    printf("Enter the Bucket Size:");
    scanf("%d", &b_size);    for(i = 0; i<NOF_PACKETS;
    ++i)
    {
        if( (packet_sz[i] + p_sz_rm) > b_size)        if(packet_sz[i] >
        b_size)/*compare the packet siz with bucket size*/
        printf("\n\nIncoming packet size (%dbytes) is Greater than bucket capacity
        (%dbytes)-PACKET REJECTED", packet_sz[i], b_size);        else
            printf("\n\nBucket capacity exceeded-PACKETS REJECTED!!");
        else
        {
            p_sz_rm += packet_sz[i];        printf("\n\nIncoming
            Packet size: %d", packet_sz[i]);        printf("\nBytes
            remaining to Transmit: %d", p_sz_rm);
            //p_time = random() * 10;
            //printf("\nTime left for transmission: %d units", p_time);
            //for(clk = 10; clk <= p_time; clk += 10)
            while(p_sz_rm>0)
            {
                sleep(1);
                if(p_sz_rm)
                {
                    if(p_sz_rm <= o_rate)/*packet size remaining comparing with
                    output rate*/
                        op = p_sz_rm, p_sz_rm = 0;
                    else
                        op = o_rate, p_sz_rm -= o_rate;
                    printf("\nPacket of size %d Transmitted", op);
                    printf("----Bytes Remaining to Transmit: %d", p_sz_rm);
                }
            }
        }
    }
}

```

```
    }  
else  
    {  
        printf("\nNo packets to transmit!!");  
    }  
}  
}  
}
```

OUTPUT :

```
packet[0]:83 bytes
packet[1]:86 bytes
packet[2]:77 bytes
packet[3]:15 bytes
packet[4]:93 bytes
Enter the Output rate:30
Enter the Bucket Size:85

Incoming Packet size: 83
Bytes remaining to Transmit: 83
Packet of size 30 Transmitted----Bytes Remaining to Transmit: 53
Packet of size 30 Transmitted----Bytes Remaining to Transmit: 23
Packet of size 23 Transmitted----Bytes Remaining to Transmit: 0

Incoming packet size (86bytes) is Greater than bucket capacity (85bytes)-PACKET REJECTED

Incoming Packet size: 77
Bytes remaining to Transmit: 77
Packet of size 30 Transmitted----Bytes Remaining to Transmit: 47
Packet of size 30 Transmitted----Bytes Remaining to Transmit: 17
Packet of size 17 Transmitted----Bytes Remaining to Transmit: 0

Incoming Packet size: 15
Bytes remaining to Transmit: 15
Packet of size 15 Transmitted----Bytes Remaining to Transmit: 0

Incoming packet size (93bytes) is Greater than bucket capacity (85bytes)-PACKET REJECTED
```

5. Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

ClientTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName, serverPort))
sentence = input("\nEnter file name: ")
```

```
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ('\nFrom Server:\n')
print(filecontents)
clientSocket.close()
```

ServerTCP.py

```
from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_STREAM)
serverSocket.bind((serverName, serverPort))
serverSocket.listen(1)
while 1:
    print ("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()
```

```
    file=open(sentence, "r")
    l=file.read(1024)
```

```
    connectionSocket.send(l.encode())
    print ('\nSent contents of ' + sentence)
    file.close()
    connectionSocket.close()
```

OUTPUT :

```
Command Prompt - python tcpserver.py
Microsoft Windows [Version 10.0.19042.1415]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo>cd desktop

C:\Users\Lenovo\Desktop>python tcpserver.py
The server is ready to receive

Sent contents of tcpserver.py
The server is ready to receive

Command Prompt
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo>cd desktop

C:\Users\Lenovo\Desktop>python tcpclient.py

Enter file name: tcpserver.py

From Server:

from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print ("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

    file=open(sentence,"r")
    l=file.read(1024)

    connectionSocket.send(l.encode())
    print ('\nSent contents of ' + sentence)
    file.close()
    connectionSocket.close()

C:\Users\Lenovo\Desktop>
```

6. Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

ClientUDP.py

```
from socket import * serverName
= "127.0.0.1" serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
```

```
sentence = input("\nEnter file name: ")
```

```
clientSocket.sendto(bytes(sentence,"utf-8"),(serverName, serverPort))
```

```
filecontents,serverAddress = clientSocket.recvfrom(2048)
print ('\nReply from Server:\n') print
(filecontents.decode("utf-8")) # for i in filecontents: #
print(str(i), end = '') clientSocket.close()
clientSocket.close()
```

ServerUDP.py

```
from socket import * serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
```

```

serverSocket.bind(("127.0.0.1", serverPort))
print ("The server is ready to receive") while 1:
    sentence, clientAddress = serverSocket.recvfrom(2048)
sentence = sentence.decode("utf-8")    file=open(sentence,"r")
    l=file.read(2048)

    serverSocket.sendto(bytes(l,"utf-8"),clientAddress)

    print ('\nSent contents of ', end = ' ')
print (sentence)    # for i in sentence:
# print (str(i), end = "")    file.close()

```

OUTPUT :

The screenshot shows two side-by-side Windows Command Prompt windows. The left window is titled 'Command Prompt - python serverudp.py' and shows the execution of the server script. The right window is titled 'Command Prompt' and shows the execution of the client script.

```

Command Prompt - python serverudp.py
Microsoft Windows [Version 10.0.19042.1415]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo>cd desktop

C:\Users\Lenovo\Desktop>python serverudp.py
The server is ready to receive

Sent contents of  serverudp.py

Command Prompt
Microsoft Windows [Version 10.0.19042.1415]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo>cd desktop

C:\Users\Lenovo\Desktop>python clientudp.py
Enter file name: serverudp.py

Reply from Server:

from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print ("The server is ready to receive")
while 1:
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file=open(sentence,"r")
    l=file.read(2048)

    serverSocket.sendto(bytes(l,"utf-8"),clientAddress)
    print ('\nSent contents of ', end = ' ')
    print (sentence)
    # for i in sentence:
    # print (str(i), end = '')
    file.close()

C:\Users\Lenovo\Desktop>

```